



DNA Tribes® Digest August 1, 2011
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Introduction

Hello, and welcome to the August 2011 issue of DNA Tribes® Digest. This month's article features a mixture analysis of European populations based on genetic regions identified by *DNA Tribes®* SNP as of August 2011. This will highlight the relationships between three major European genetic groupings (Atlantic European, Baltic-Urals, and Caucasus-Anatolian) and neighboring parts of the world (such as the North African, Arabian, and Siberian regions).

This SNP based analysis complements DNA Tribes® STR based analysis of inter-regional relationships near Europe¹, as well as past articles exploring the relationships between language families and geographical links between world populations.²

Best regards,
Lucas Martin
DNA Tribes

¹ For links within Europe, see <http://dnatribes.com/dnatribes-digest-2008-11-28.pdf> and <http://dnatribes.com/dnatribes-digest-2009-03-28.pdf>; for European links with neighboring parts of the world, see <http://dnatribes.com/dnatribes-digest-2008-12-26.pdf> and <http://dnatribes.com/dnatribes-digest-2009-01-31.pdf>.

² A discussion of relationship between languages and genetic regions highlighting genetic evidence of possible ancient "substrate" contacts in Europe, see <http://dnatribes.com/dnatribes-digest-2009-07-29.pdf> and <http://dnatribes.com/dnatribes-digest-2009-08-29.pdf>.

Genetic Links between Three SNP Based Regions in Europe

Background

DNA Tribes® SNP is a geographical analysis based on autosomal SNP markers that complements DNA Tribes® STR based 15 Marker, 21 Marker, and 27 Marker Kit tests.³ *DNA Tribes*® SNP currently identifies 18 world regions based on SNP data available as of August 1, 2011 (illustrated in **Figure 1**).

Within Europe, *DNA Tribes*® SNP distinguishes three regions: Atlantic European (western⁴); Baltic-Urals (northeastern); and Caucasus-Anatolian (southeastern⁵). In addition, European genetic structure is characterized by links with the neighboring North African, Arabian, and Siberian regions.

This article will describe the relationships of these genetic groupings in more detail based on an admixture analysis of populations in and near Europe.

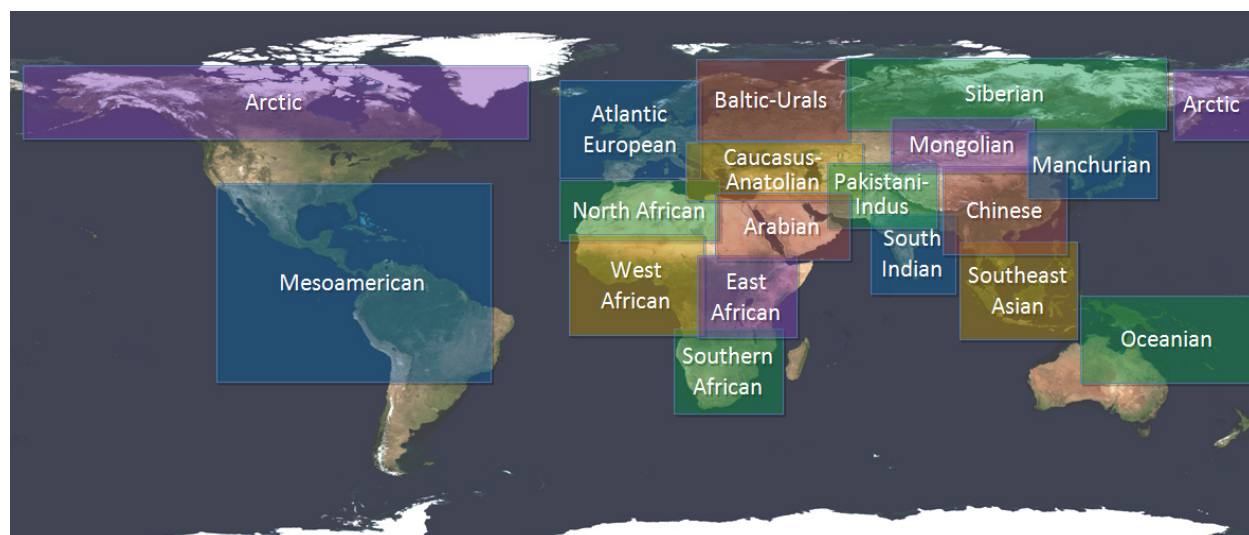


Figure 1: Map of world regions identified in *DNA Tribes*® SNP analysis as of August 1, 2011.

³ For more information about *DNA Tribes*® SNP analysis, see <http://dnatribes.com/snp.html>. For more information about DNA Tribes® STR based 15, 21, and 27 Marker Kit tests, see <http://dnatribes.com/index.html>.

⁴ The current Atlantic European genetic grouping incorporates new SNP populations and more fully characterizes populations of western and central Europe. In western and central Europe, levels of Caucasus-Anatolian admixture identified in previous *DNA Tribes*® SNP versions (prior to new data) are now characterized by higher Atlantic European levels. This suggests that this continuity with Caucasus-Anatolian populations characterizes western and central continental Europe as a whole (rather than local admixture in just some places).

⁵ The Caucasus-Anatolian region is not exclusive to Europe, as it characterizes genetic structure of Italy, the Balkan Peninsula, and indigenous populations of the North Caucasus, as well as populations of present day Turkey, the Transcaucasus, and nearby parts of Southwest Asia (see **Figure 1**).

Regional Admixture Analysis of European and Neighboring Populations

SNP admixture analysis was performed based on the above described regions for several populations in and near Europe. Results are summarized in **Table 1** and illustrated in **Figure 2**.

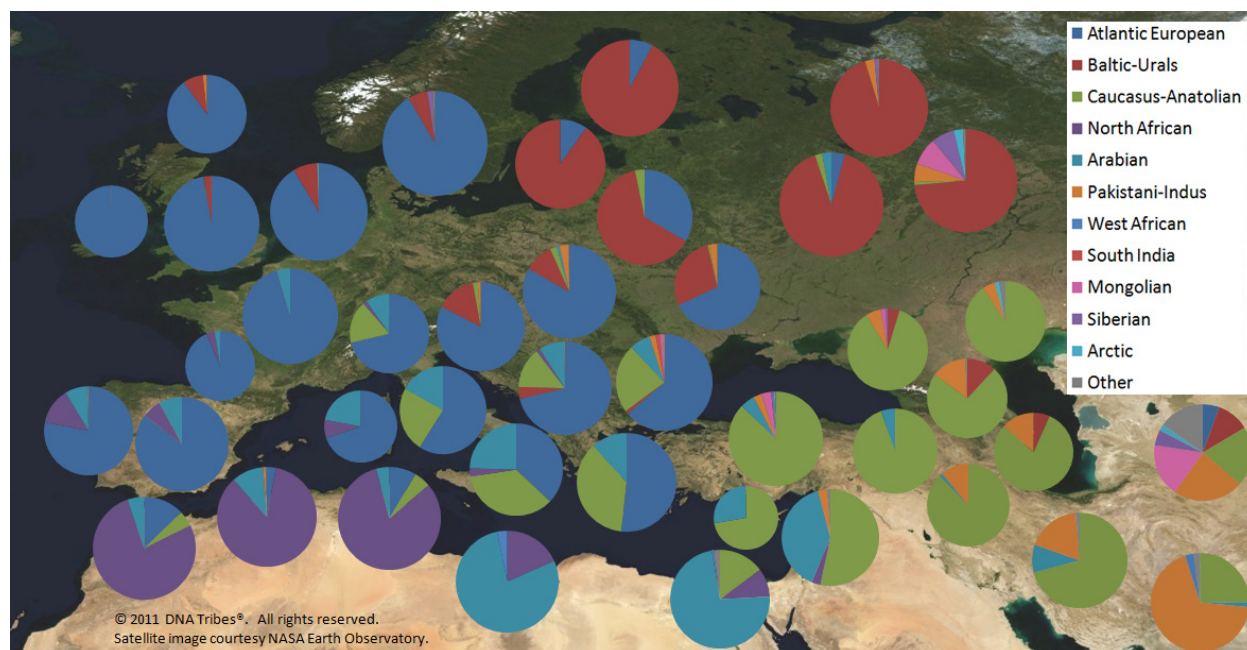


Figure 2: Map illustrating regional admixture components of European and neighboring populations based on the world regions currently identified by *DNA Tribes*® SNP analysis.

Discussion: Results in **Table 1** (on page 5) and **Figure 2** identify the geographical distributions of the three genetic regions in Europe and links with neighboring world regions.

The **Atlantic-European** genetic grouping (dark blue in **Figure 2**) primarily characterizes populations near the western Atlantic coast of Europe. This includes populations from the Iberian Peninsula (present day Portugal and Spain) in the south to Britain and Scandinavia in the north. In addition, substantial Atlantic European admixture continues into continental Western and Central Europe, as well as the Italian Peninsula and Balkan Peninsula. Lower levels of Atlantic European admixture are also observed in some northerly populations of northwest Africa (such as North Morocco and Tunisia), which might express recent historical contacts, as well as more ancient links via the Mediterranean Sea.

The **Baltic-Urals** genetic grouping (red in **Figure 2**) primarily characterizes populations between the Baltic Sea and Ural Mountains of northeastern Europe. This includes areas where several unrelated languages are spoken today, including some East Slavic (such as Belarus and Russia), Baltic (Lithuania), Finnic (Finland), and Oghur Turkic (Chuvash) languages.

However, the Baltic-Urals genetic region somewhat resembles the more ancient Comb Ceramic archaeological zone that existed between 4200 and 2000 BCE. These hunting-fishing cultures are sometimes thought to relate early Uralic languages in Europe (ancestral to modern Saami, Finnish, Mari, Udmurt, and others) and several languages of Siberia (such as Selkup and Khanty). This suggests that Baltic-Urals populations might (to some extent) retain local genetic characteristics that predate the

formation of modern Slavic and Turkic speaking societies, perhaps linked to indigenous Uralic speaking cultures resident in northeastern Europe since the Mesolithic period.

The **Caucasus-Anatolian** genetic region (green in **Figure 2**) primarily characterizes populations of highland Southwest Asia, including Anatolia (present day Turkey) and the lands surrounding the Caucasus Mountains. This region has been an important nexus of ancient culture, including some of the earliest farming settlements (such as Çatalhöyük) and later seats of ancient civilization and technology (such as the Hittite Empire, involved in the early development of iron metallurgy). Other innovations associated with this mountainous area are viticulture (wine making) and domesticated sheep and goats, later adopted by neighboring civilizations of the Near East and Europe.

However, the role played by cultures from highland Southwest Asia in the early civilizations of the Fertile Crescent tends to be unknown or overshadowed in history by later and better known empires of the Near East. Nevertheless, these inter-cultural links are attested, for instance, in the archaeological distributions of Khirbet Kerak and later Khabur ware pottery, associated with expansions of Hurrian speaking cultures from the north and northeast (possibly from near the Caspian Sea).

Similarly mysterious are possible linguistic links between the ancient Sumerian and Hurro-Urartian languages and the modern Nakh-Daghestanian (Caspian) languages spoken today. Other unclassified ancient languages attested near highland Southwest Asia include Kassite and Elamite (possibly related to the Dravidian languages of the Indian Subcontinent). These early languages are neither Indo-European nor Afro-Asiatic and perhaps represent an old stratum of cultures indigenous to lands near highland Southwest Asia, later absorbed by the expansions of neighboring empires.

Within Europe, Caucasus-Anatolian admixture is found in Greece, Italy, and the Balkan Peninsula. Notably, these areas have been a contact point with the Near East since at least the Neolithic period, when the “Old European” farming cultures emerged using agricultural technologies introduced from Anatolia and the Aegean Sea.

In addition to these three primary genetic groupings in Europe, results in **Table 1** indicate substantial admixture from several neighboring world regions. In southwestern Europe (including Spain, Portugal, Sardinia, and French Basque populations), **North African** admixture is observed (purple in **Figure 2**). This might express links with North Africa during the medieval period (including the Moorish civilization of Al-Andalus), as well as more ancient links dating at least to the period of the classical Phoenicians and Carthaginians. Similarly, low levels of Atlantic European admixture are observed in some neighboring populations of North Africa (such as North Morocco and Tunisia, seat of ancient Carthage). This suggests reciprocal patterns of contact via the Mediterranean Sea.

Results also identified **Arabian** admixture (light blue in **Figure 2**) in southern Europe, including Italy and Sardinia, as well as the Balkan and Iberian peninsulas. This might express ongoing maritime contacts via the Mediterranean Sea, attested since early prehistory in the spread of the “maritime pioneers” of the Cardial Ware culture, the spread of Greek colonies and Phoenician trading posts in classical antiquity, and the Italian maritime republics that linked civilizations of the medieval world.

Lastly, results indicated **Pakistani-Indus** admixture (orange in **Figure 2**) in several of the easternmost populations included in the analysis (such as Dargins, Adyghe, and Chuvash), and to a smaller extent in some populations near the Pontic-Caspian steppes (such as Romanians, Ukrainians, Hungarians, and Slovenes). This might express contacts with early steppe populations linked to South and Central Asia, including pastoralist-metallurgist “kurgan” cultures of the Bronze Age, the enigmatic “Thraco-Cimmerian” migrations of the early Iron Age, and the Scythians and Sarmatians of classical antiquity.



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Population	Atlantic European	Baltic-Urals	Caucasus-Anatolian	North African	Arabian	Pakistani-Indus	West African	South India	Mongolian	Siberian	Arctic	Other
Adyghe (North Caucasus)	0.0%	4.7%	86.5%	0.0%	0.0%	6.0%	0.0%	0.0%	1.8%	0.9%	0.0%	0.0%
Algeria	2.9%	0.0%	0.0%	85.5%	10.4%	0.8%	0.0%	0.0%	0.0%	0.0%	0.2%	0.3%
Armenian	0.0%	0.0%	94.6%	0.0%	5.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Balkan Slavs (Other)	71.4%	4.1%	14.1%	1.4%	8.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%
Basque France	93.5%	0.0%	0.0%	3.9%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Belarus	33.3%	63.3%	3.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bergamo Italy	71.3%	0.0%	17.4%	1.5%	9.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Chuvash	0.0%	73.6%	1.0%	0.0%	0.0%	5.7%	0.0%	0.0%	8.7%	7.2%	2.9%	0.9%
Cyprus	0.0%	0.0%	72.4%	0.0%	27.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dargin (Urkarah, Dagestan)	0.0%	11.9%	73.3%	0.0%	0.0%	14.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%
Egypt (Sample 2)	0.0%	0.0%	14.9%	9.3%	73.1%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	2.1%
Finland	7.8%	92.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
France	95.4%	0.0%	0.0%	0.0%	4.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Great Britain (England and Scotland)	97.2%	2.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Greece	51.8%	0.0%	36.5%	0.0%	11.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Hungary	83.1%	10.2%	2.3%	0.0%	1.0%	3.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
Iran	0.0%	0.0%	70.9%	0.0%	9.4%	18.2%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%
Ireland	99.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Kumyk (Stalskoe, Daghestan)	0.0%	0.0%	90.7%	0.0%	0.0%	4.7%	0.0%	0.0%	0.3%	0.0%	1.6%	2.6%
Kurdish	0.0%	0.0%	87.6%	0.0%	1.4%	11.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lebanon	0.0%	0.0%	53.4%	3.0%	39.5%	3.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%
Lezgin (Caucasus)	0.0%	6.6%	79.8%	0.0%	0.0%	13.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
Libya	0.0%	0.0%	0.0%	18.4%	78.4%	0.0%	3.2%	0.0%	0.0%	0.0%	0.0%	0.0%



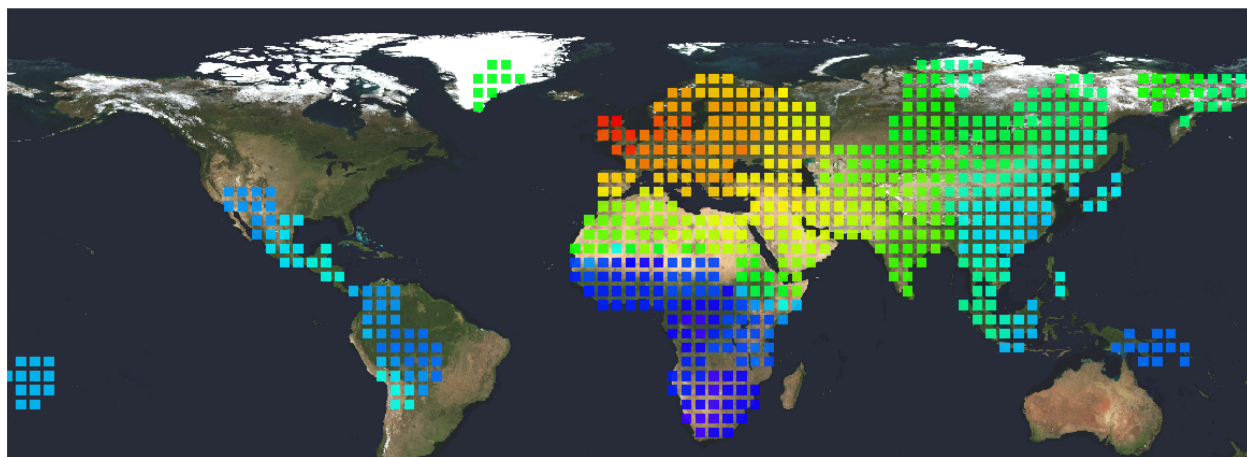
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Lithuania	9.9%	90.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Makrani (Pakistan)	0.0%	0.0%	25.0%	0.0%	1.5%	68.5%	2.8%	0.0%	0.0%	0.0%	0.0%	2.2%
Netherlands	91.4%	8.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.2%
North Morocco	12.8%	0.0%	4.9%	77.0%	5.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Orkney Islands	90.0%	8.3%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Portugal	78.1%	0.0%	0.0%	13.3%	8.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%
Romania	63.8%	1.1%	23.1%	0.0%	7.0%	2.1%	0.0%	1.5%	1.1%	0.0%	0.1%	0.3%
Russia	4.2%	90.7%	2.3%	0.0%	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Sardinia	69.9%	0.0%	0.0%	8.0%	22.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Scandinavia	91.6%	6.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.6%	0.0%	0.7%
Slovenia	82.6%	14.6%	1.8%	0.0%	0.0%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Southern Italy and Sicily	37.0%	0.0%	35.6%	2.9%	24.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Spain	85.5%	0.0%	0.0%	6.5%	8.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Tunisia	8.5%	0.0%	5.3%	82.0%	4.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Turkey	0.0%	0.0%	87.2%	0.0%	4.9%	3.0%	0.0%	0.0%	3.3%	0.9%	0.4%	0.3%
Tuscany Italy	58.9%	0.0%	24.2%	0.0%	16.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Ukrainians (mixed)	67.9%	28.4%	0.6%	0.0%	0.0%	3.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Uzbek (Central Asia)	5.5%	10.9%	19.7%	0.0%	0.0%	23.7%	0.0%	0.0%	17.5%	5.2%	2.1%	15.3%
Vologda Russia	0.0%	95.3%	0.0%	0.0%	0.0%	3.1%	0.0%	0.0%	0.0%	1.2%	0.0%	0.4%

Table 1: Table listing regional genetic contributions to European and neighboring populations based on the world regions currently identified by DNA Tribes® SNP analysis.

DNA Tribes® SNP Update for August 2011



We are pleased to announce an August 2011 update for *DNA Tribes®* SNP analysis. Based on additional SNP populations as well as new customer data from around the world, we have updated all portions of our SNP analysis for a fuller and more detailed geographical analysis of your SNP genotype.

New reference populations: Several new populations have been added to our SNP database:

Colombian
Dominican Republic
Ecuadorian
Finland

Great Britain (England and Scotland)
Puerto Rican
Southern China
Spain

These new reference populations are now included in the total similarity comparisons in each *DNA Tribes®* SNP report. These populations as well as new customer data from around the world are incorporated in admixture and world grid analysis.

Based on new data, admixture analysis now includes a fuller characterization of the Atlantic European, Baltic-Urals, and Chinese genetic groupings and distinguishes an additional Mongolian genetic region within North Asia.

New sample reports and update orders are available at: <http://www.dnatribes.com/snp.html>.

One Week SNP Sale (expires August 9th, 2011): For one week only, *DNA Tribes®* SNP analysis is available for a **reduced total of \$49.99 per genotype** with submitted grandparent information.

Our One Week SNP Sale is available at <http://www.dnatribes.com/snp.html>.